

Data-Driven Innovations In Supply Chain Management With Qlik Insights

1. Introduction

1.1 Overview

This project aims to revolutionize supply chain management for DataCo Global, a retail company with extensive data on its product management processes. By leveraging data-driven insights through Qlik, we seek to optimize various aspects of the supply chain, including inventory management, product offerings, and operational efficiency. The project focuses on utilizing advanced analytics to provide actionable insights that can enhance customer experiences, streamline operations, and support informed decision-making across the organization.

1.2 Purpose

The primary purpose of this project is to harness the power of data analytics to improve DataCo Global's supply chain management. By analyzing the vast amount of data collected by the company, we aim to achieve the following:

- **Optimize Inventory Management:** Improve stock levels to meet customer demand while minimizing excess inventory.
- **Enhance Product Offerings:** Identify trends and customer preferences to refine product offerings.
- **Improve Supply Chain Efficiency:** Streamline logistics and reduce lead times for better operational performance.
- **Personalize Customer Experiences:** Use data insights to tailor customer interactions and improve satisfaction.
- **Drive Data-Driven Decision-Making:** Provide stakeholders with clear, actionable insights to make informed business decisions.

1.3 Technical Architecture

The technical architecture of this project involves several key components:

- **Data Collection and Integration:** Aggregate and centralize data from various sources within the supply chain using robust data integration strategies.
- **Data Preparation:** Clean, transform, and prepare the data for visualization and analysis.

- **Qlik Sense:** Utilize Qlik Sense for its advanced visualization and analytics capabilities to create dynamic dashboards and reports.
- **Visualization and Dashboards:** Develop interactive and intuitive dashboards to display insights on supply chain performance, inventory levels, customer behavior, and more.
- **Performance Testing:** Ensure the solution performs efficiently by testing data rendering, filter utilization, and calculation fields.
- **Documentation and Demonstration:** Record a detailed video explanation and provide comprehensive project documentation, outlining each step of the development process.

By implementing this architecture, DataCo Global can transform its supply chain operations, leading to improved efficiency, reduced costs, and enhanced competitiveness in the market.

2. Define Problem/Problem Understanding

2.1 Specify the Business Problem

This project aims to transform supply chain management by utilizing data-driven insights through Qlik. By leveraging advanced analytics, the project seeks to optimize logistics, forecasting, and inventory management, thereby enhancing operational efficiency and responsiveness. The goal is to reshape the supply chain landscape by using Qlik's powerful data-driven capabilities to revolutionize logistics, forecasting, and inventory management, ultimately improving operational efficiency and responsiveness.

2.2 Business Requirements

To achieve the project's goals, the following business requirements need to be addressed:

- **Data Integration:** Develop a comprehensive data integration strategy to aggregate and centralize relevant data from various supply chain sources.
- **Visualization:** Utilize Qlik's advanced visualization features to create intuitive and dynamic dashboards, offering stakeholders clear insights into the entire supply chain ecosystem.
- **Analytics:** Use Qlik's advanced analytics tools to analyze historical logistics data, identify patterns, and optimize transportation routes.
- **Real-Time Tracking:** Implement real-time tracking and monitoring solutions to improve visibility into the movement of goods, reducing lead times and minimizing transportation costs.
- **Proactive Decision-Making:** Employ real-time analytics to facilitate swift decision-making in response to unforeseen events or demand changes, ensuring a proactive and responsive supply chain.

2.3 Literature Survey

A literature survey on the theme of revolutionizing supply chain management through data-driven insights and advanced analytics reveals extensive research and scholarly articles on similar initiatives. Studies highlight the increasing recognition of the pivotal role data analytics play in transforming traditional supply chain processes. Research underscores the effectiveness of using advanced analytics tools, like Qlik, to enhance visibility and decision-making in supply chain operations. Findings emphasize significant improvements in logistics optimization, forecasting accuracy, and inventory management efficiency. Additionally, the survey explores diverse analytical techniques and technologies, showcasing successful implementations across various industry sectors that demonstrate notable improvements in operational efficiency and responsiveness. Challenges and opportunities related to adopting data-driven insights in supply chain contexts are also examined, with literature stressing the importance of developing robust data governance frameworks and fostering a data-driven culture to fully realize potential benefits.

2.4 Social or Business Impact

Social Impact Analysis

- **Demographic Distribution:** Create visualizations to showcase the demographic distribution of supply chain management.
- **Social Welfare Programs:** Analyze how data-driven innovations in supply chain management have impacted social welfare programs, financial inclusion, and other key areas.
- **Correlations:** Explore any correlations between the use of data-driven innovations and improvements in social metrics.

Business Impact Analysis

- **Sector Impact:** Analyze how data-driven innovations in supply chain management have affected businesses, especially in sectors like banking, telecommunications, and e-commerce.
- **Operational Efficiency:** Evaluate the impact of data-driven innovations on sales, customer onboarding, and operational efficiency in supply chain management.

By addressing these aspects, the project aims to provide comprehensive insights into both the social and business impacts of implementing data-driven innovations in supply chain management.

3. Data Collection

3.1 Collect the Dataset

Data collection involves gathering and measuring information in a systematic and organized manner. This process helps us collect data on variables of interest, enabling us to answer questions, test hypotheses, evaluate outcomes, and generate insights from the information we gather. For this project, we use datasets from Kaggle.

Downloading the Dataset

To obtain the necessary dataset for this project, please use the following link: [DataCo SMART SUPPLY CHAIN FOR BIG DATA ANALYSIS | Kaggle](#).

Understanding the Data

The dataset contains comprehensive meta information regarding various columns described in the CSV files. Below is the column description:

- **Type:** Type count
- **Days for shipping (real):** Product shipment days
- **Days for shipment (scheduled):** Product preparation time for shipment
- **Benefit per item:** Profit earned per product
- **Sales per customer:** Number of products purchased by the customer
- **Delivery:** Product delivery date
- **Late_delivery_risk:** Percentage of late delivery risk
- **Category Id:** Product category ID
- **Category:** Product category
- **Customer City:** City where the customer made a purchase
- **Customer Country:** Country where the customer made a purchase
- **Customer Email:** Customer's email address
- **Customer Fname:** Customer's first name
- **Customer ID:** Customer's order ID
- **Customer Lname:** Customer's last name
- **Customer Segment:** Type of customer
- **Customer State:** State where the customer made a purchase
- **Customer Street:** Customer's address
- **Customer Zipcode:** Customer's area code
- **Market:** Top 10 country market
- **Order City:** City where the order was placed

- **Order Country:** Country where the order was placed
- **Order Customer ID:** Customer's order ID
- **Order Date (DateOrders):** Date the order was placed
- **Order Item Product Price:** Price of the product
- **Order Item Profit Ratio:** Profit ratio
- **Order Item Quantity:** Number of orders placed
- **Sales:** Total number of sales
- **Order Item Total:** Total price of the order placed
- **Order Profit Per:** Product
- **Order Region:** Region where the order was placed
- **Order State:** State where the order was placed
- **Order Status:** Delivery status of the order
- **Order Zipcode:** Customer's area code
- **Product Card ID:** Product number
- **Product Category Id:** Product's category ID
- **Product:** Type of product
- **Product Image:** Image of the product
- **Product Price:** Price of the product

3.2 Connect Data with Qlik Sense

To connect data with Qlik Sense, follow these steps:

1. **Open Qlik Sense:** Launch the Qlik Sense application.
2. **Navigate to Data Load Editor:** Go to the data load editor within the application.
3. **Add Data:** Add your dataset or connect to a data source such as Excel or a database.
4. **Map Data Fields:** Ensure that your data fields are correctly mapped to align with the expected schema.
5. **Load Data:** Load the mapped data into your Qlik Sense app.

Once your dataset is successfully loaded, you can analyze and visualize your data within Qlik Sense. Use its various tools and features to gain insights and make informed decisions.

4. Data Preparation

4.1 Prepare the Data for Visualization

Preparing the data for visualization involves several key steps to ensure the data is clean, accurate, and in a suitable format for analysis. This process includes:

- **Data Cleaning:** Removing irrelevant or missing data to ensure the dataset is complete and accurate.
- **Data Transformation:** Converting the data into a format that can be easily visualized.

- **Data Exploration:** Identifying patterns and trends within the data.
- **Data Filtering:** Focusing on specific subsets of data relevant to the analysis.
- **Software Preparation:** Ensuring the data is ready for use with visualization tools.

This thorough preparation makes the data easily understandable and ready for creating visualizations, which will help gain insights into performance and efficiency. Since the dataset for this project is already cleaned, we can proceed directly to the visualization stage.

5. Data Visualizations

5.1 Visualizations

Data Visualization

Data visualization is the process of creating graphical representations of data to help people understand and explore the information. The goal of data visualization is to make complex data sets more accessible, intuitive, and easier to interpret. By using visual elements such as charts, graphs, and maps, data visualizations can help people quickly identify patterns, trends, and outliers in the data.

Number of Unique Visualizations

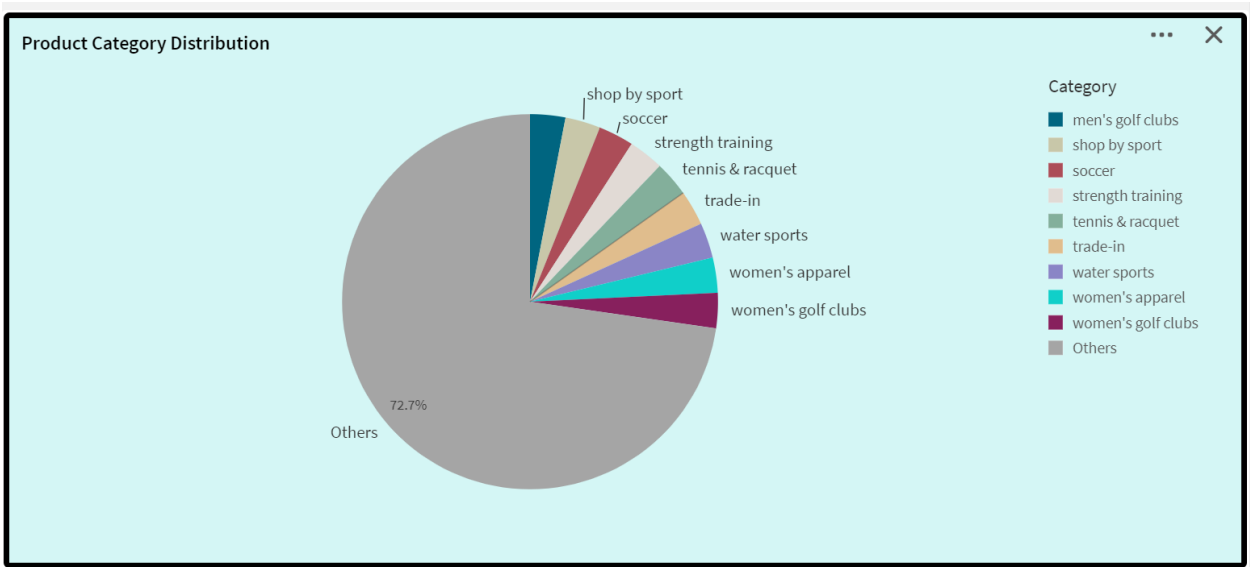
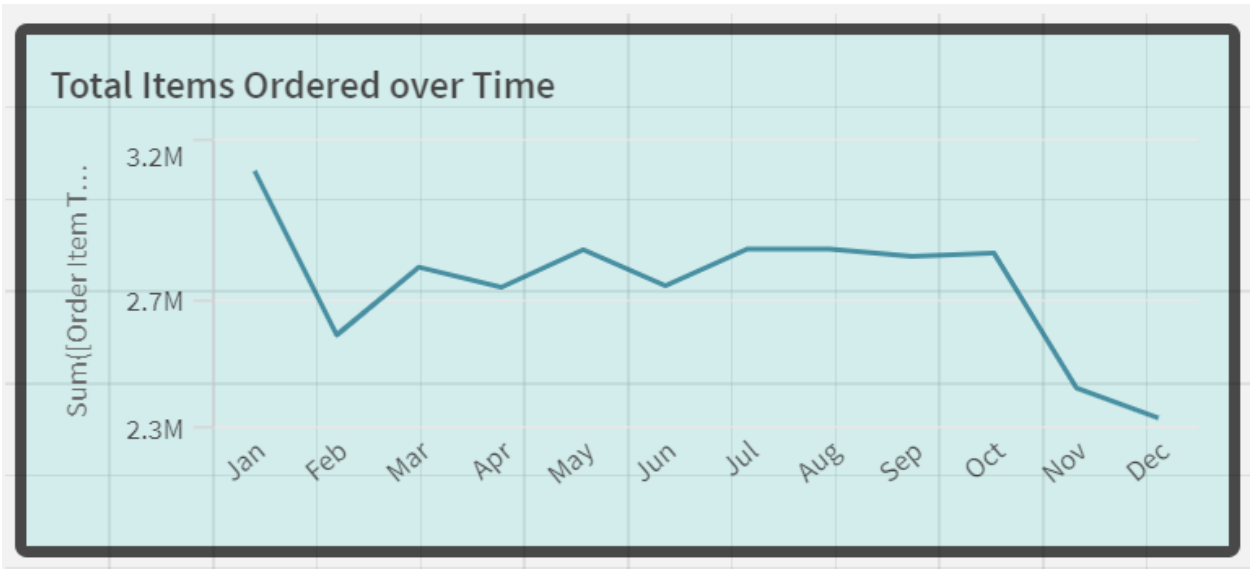
The number of unique visualizations that can be created with a given dataset can vary significantly. Some common types of visualizations include:

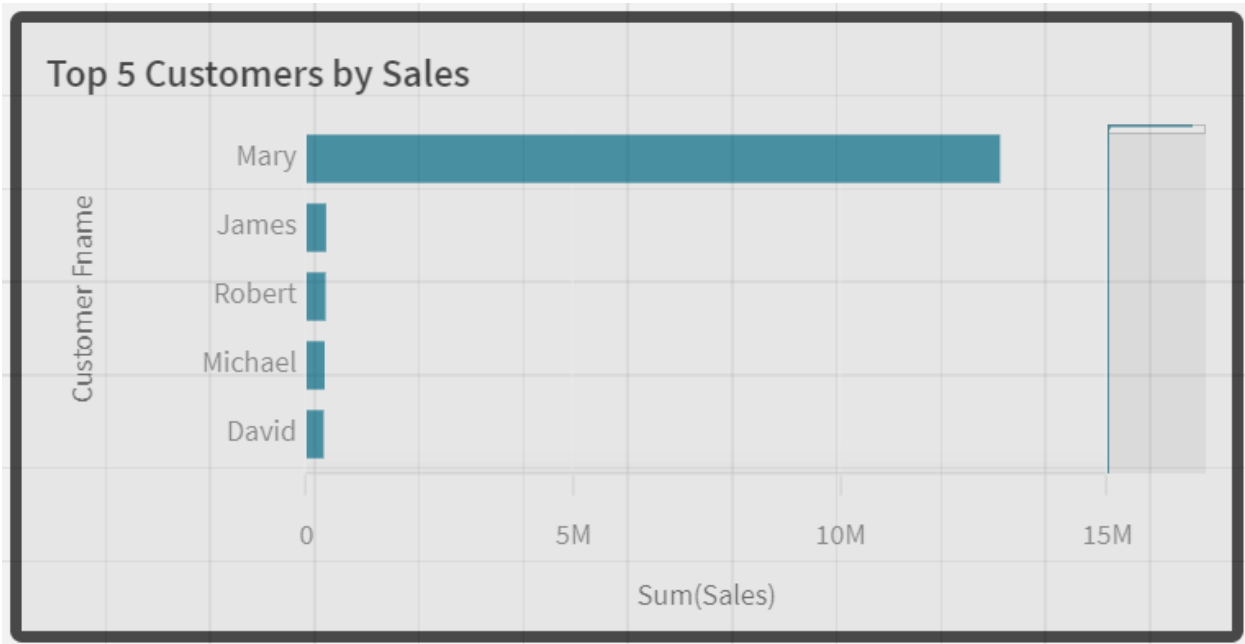
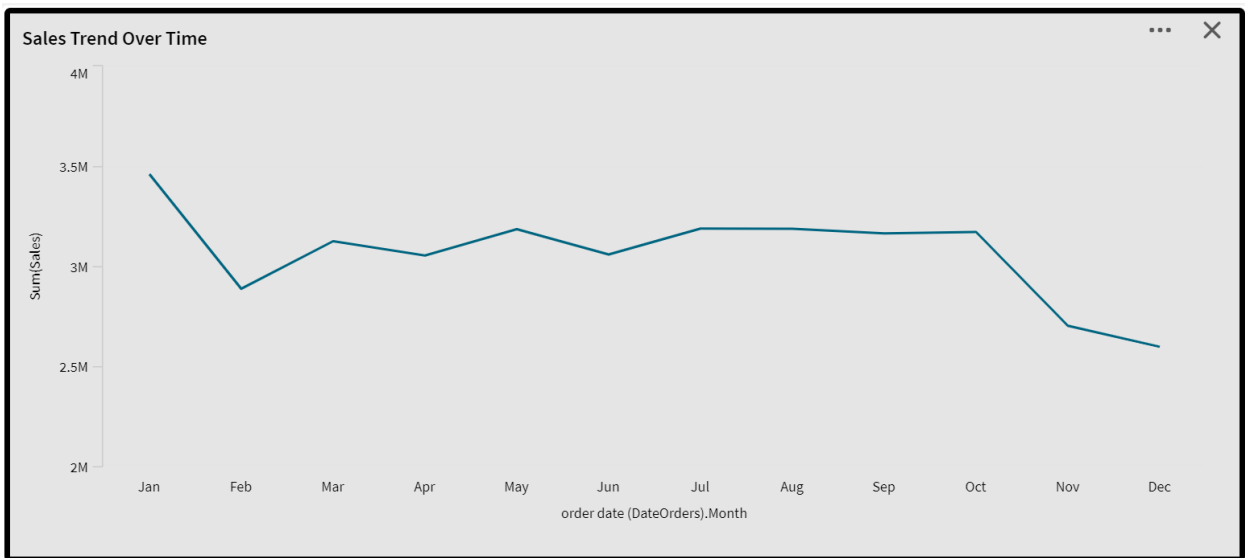
- **Bar Charts:** Useful for comparing different categories or groups.
- **Line Charts:** Ideal for tracking changes over time.
- **Heat Maps:** Effective for showing the intensity of data points in a two-dimensional space.
- **Scatter Plots:** Great for identifying relationships and correlations between variables.
- **Pie Charts:** Helpful for illustrating proportions and percentages.
- **Maps:** Useful for geographical data visualization.

These visualizations can be used to analyze various aspects of performance and efficiency, such as comparing performance, tracking changes over time, showing distributions, and highlighting relationships between variables. They can also break down revenue and customer demographics, workload, resource allocation, and geographical data. Total more than 10 unique visualizations are used.

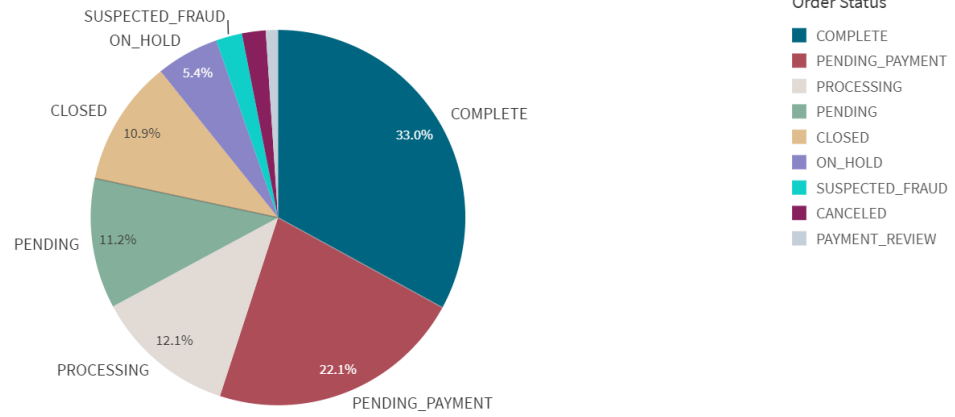
Visualizations

Below are the types of visualizations created for this project:

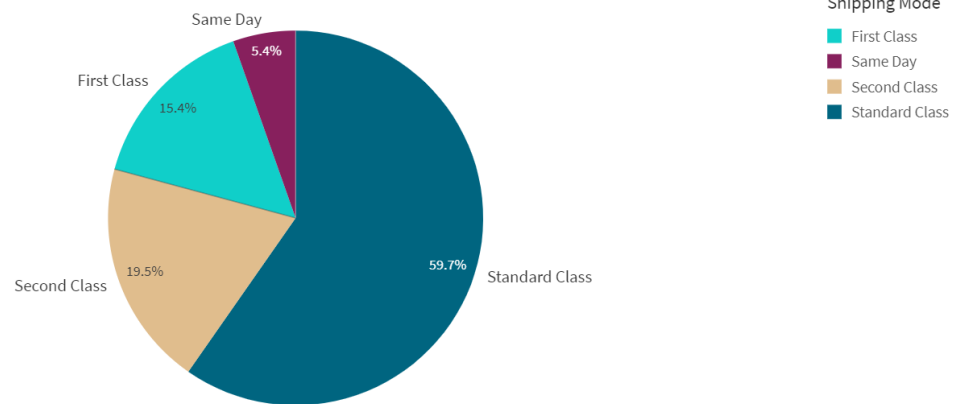


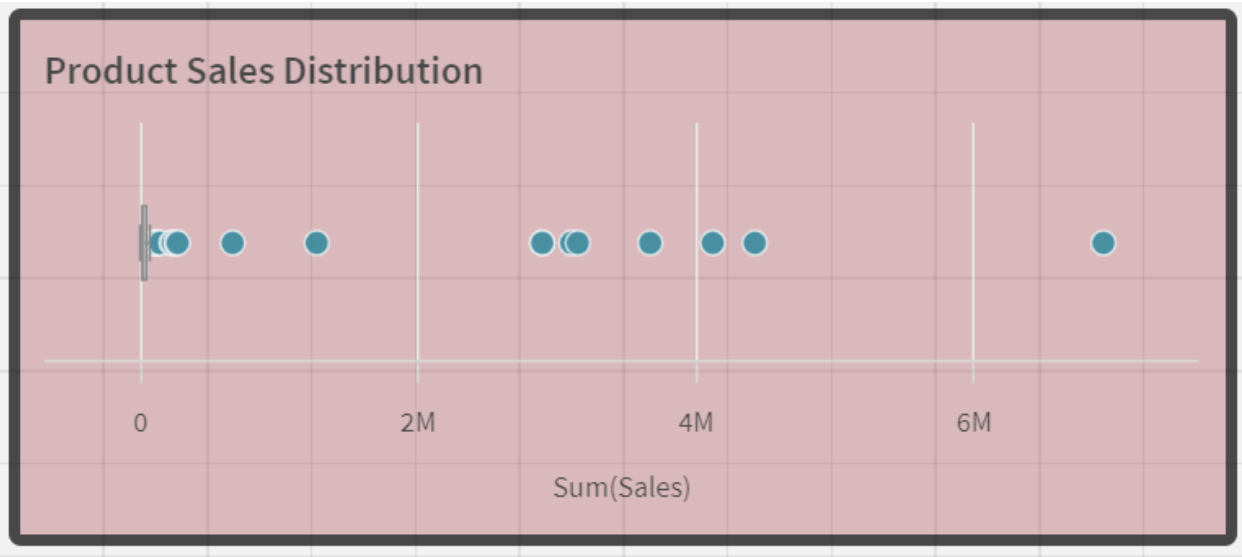
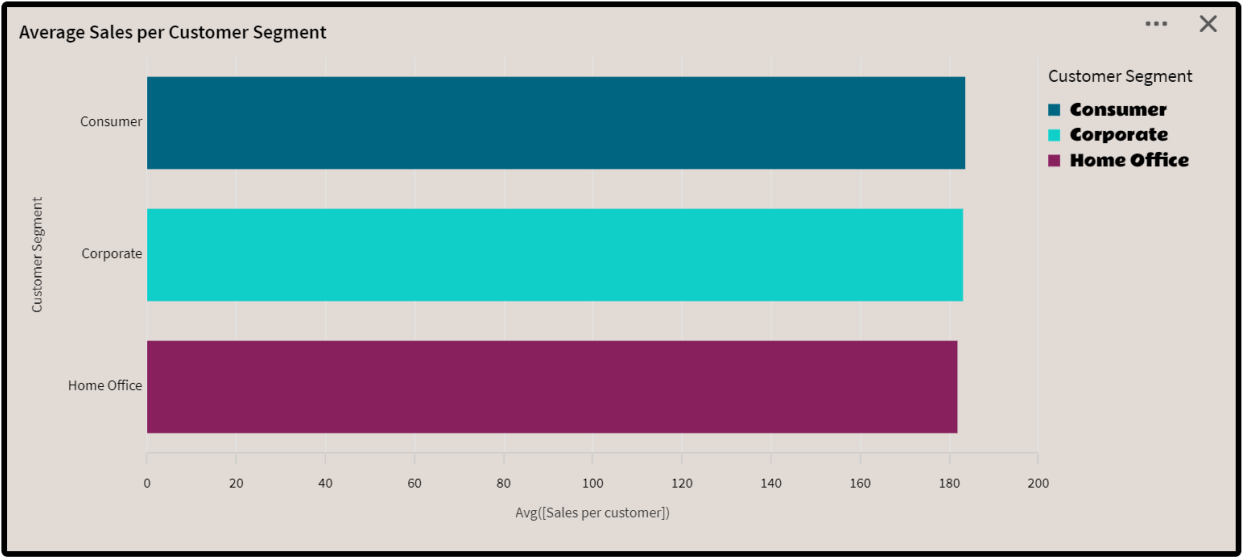


Orders by Status

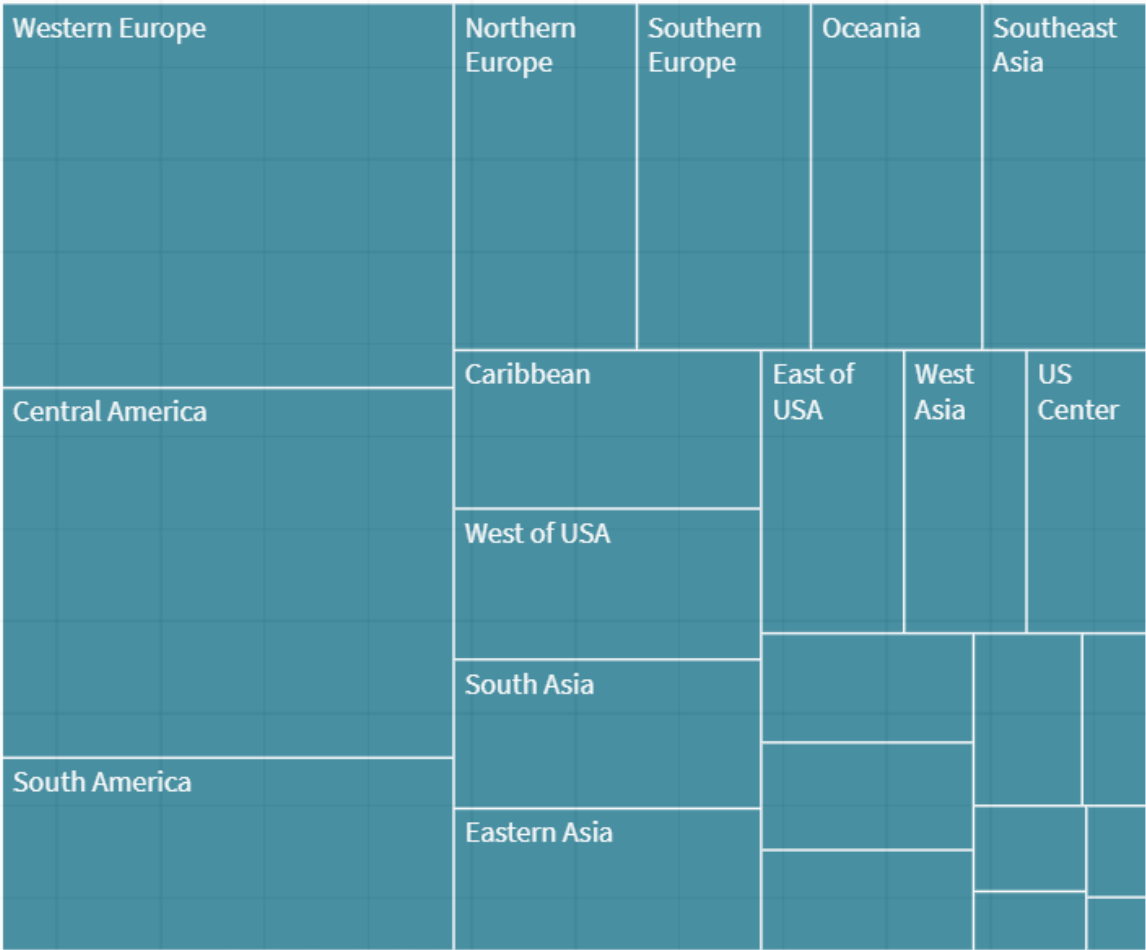


Shipping Mode Analysis

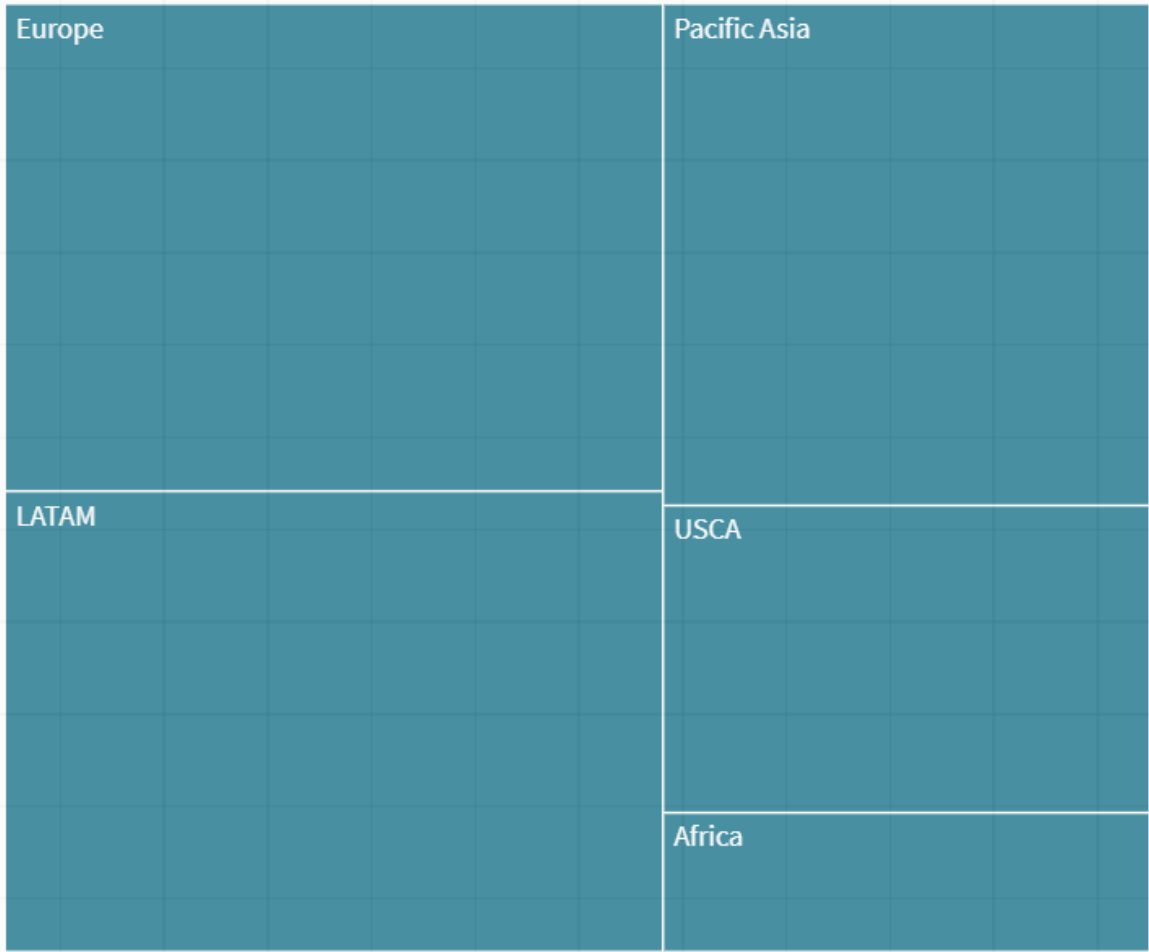


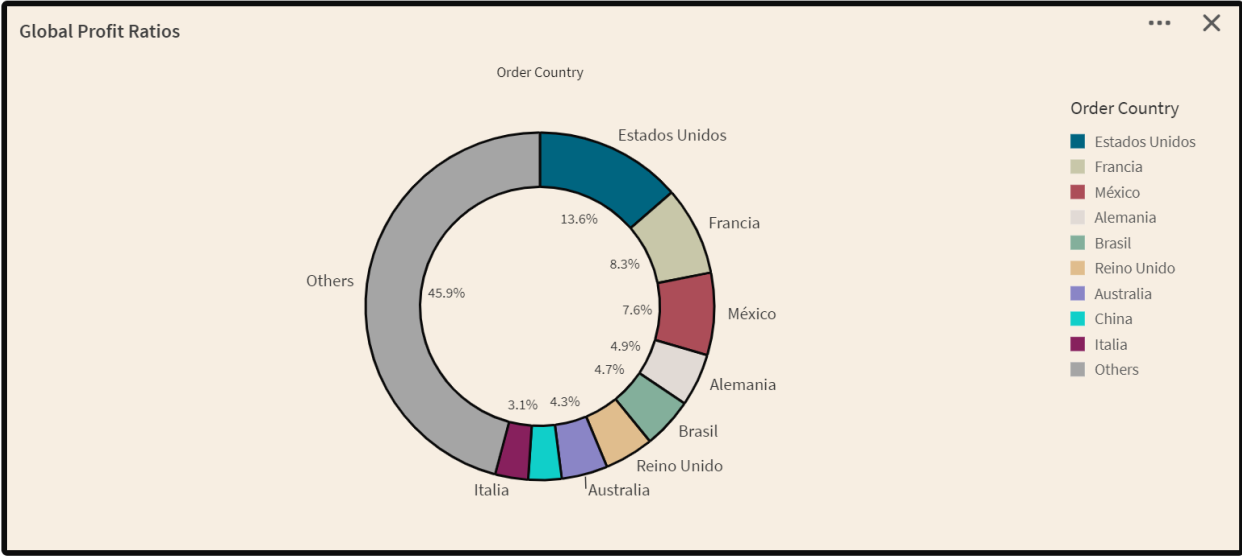
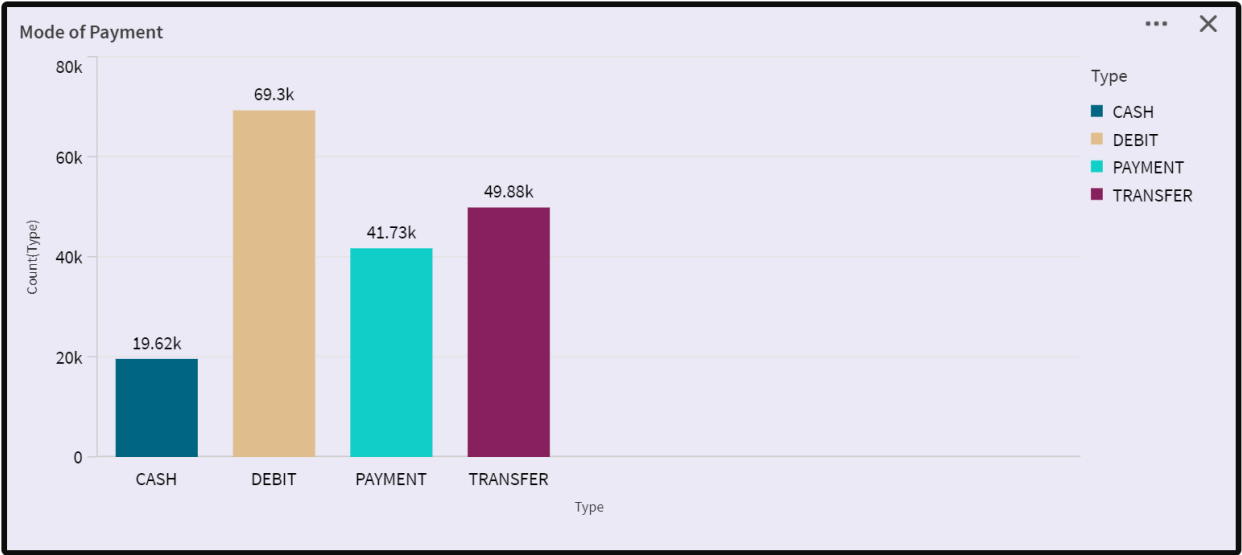


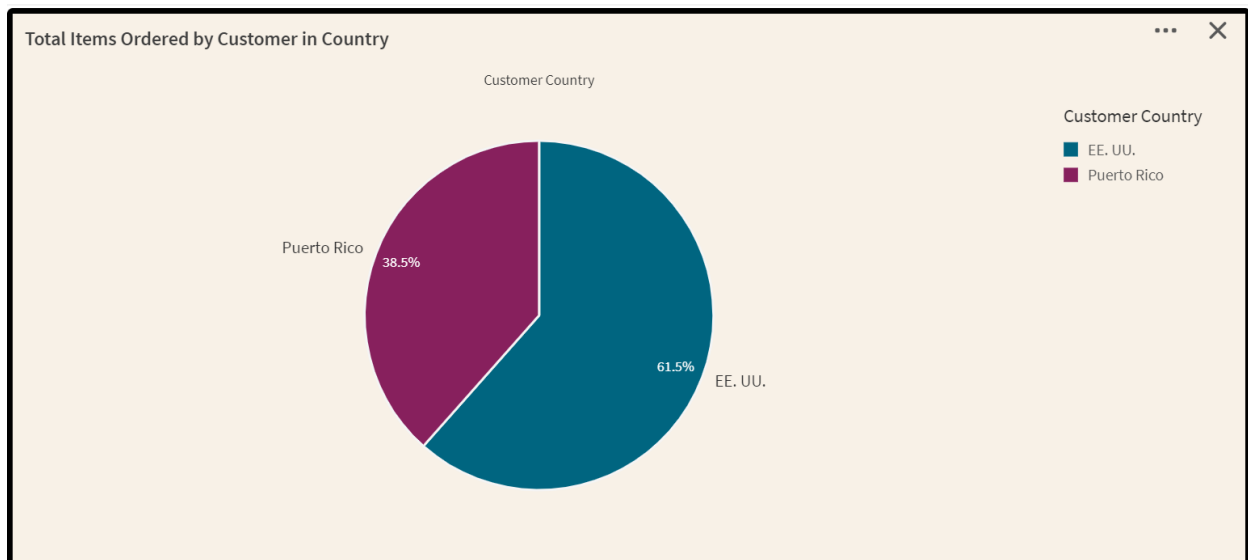
Market Share by Region



Top 5 Markets







- **Total Items Placed by Customer in Country:** Visualizes the total number of items placed by customers in different countries.
- **Total Items Placed by State:** Shows the distribution of items placed by customers across various states.
- **Analysis on Customer Segment:** Analyzes different customer segments to understand their purchasing behavior.
- **Mode of Payment:** Displays the preferred payment methods used by customers.
- **Customer Purchase by City:** Visualizes the number of purchases made by customers in different cities.
- **Delivery Status of Orders:** Shows the status of order deliveries (e.g., on-time, late).
- **Analysis on Benefit per Order:** Analyzes the profit earned per order.
- **Analysis on Profit Ratio:** Examines the profit ratios for different products or categories.
- **Market Analysis:** Provides insights into market performance and trends.
- **Analysis on Order Region:** Visualizes the distribution of orders across various regions.

6. Dashboard

6.1 Responsive and Design of Dashboard

Dashboard

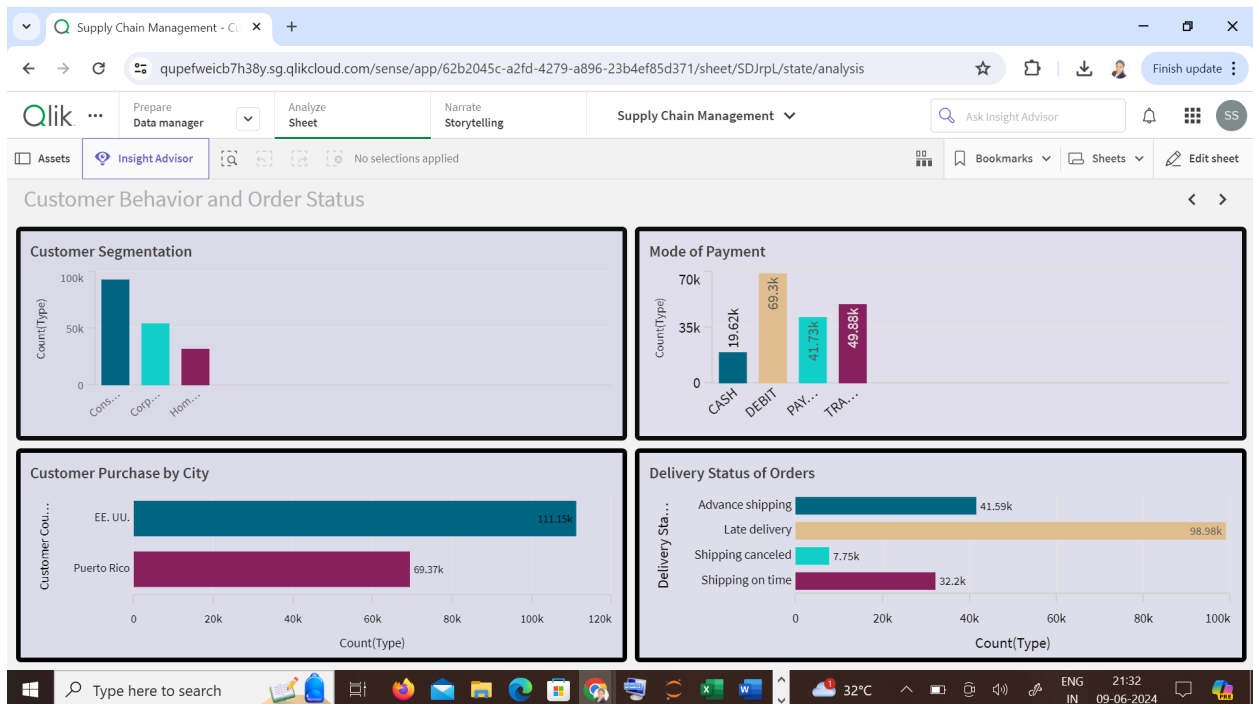
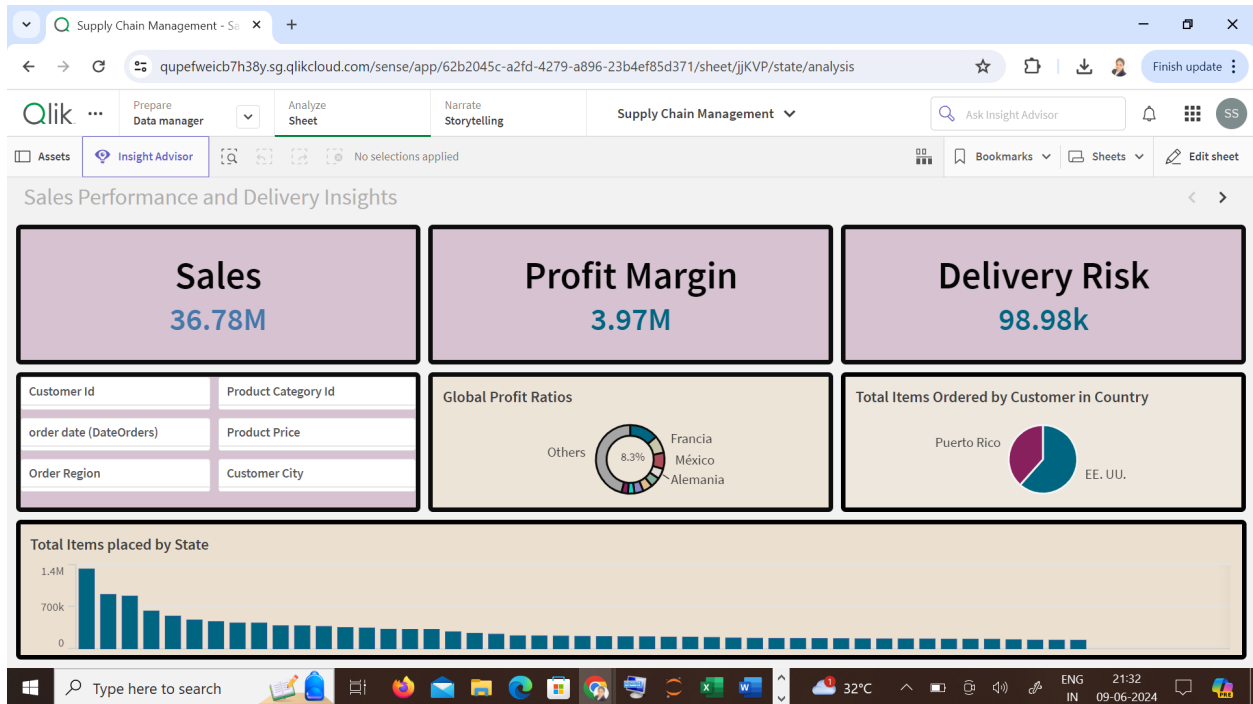
A dashboard is a graphical user interface (GUI) that organizes and displays information and data in an easy-to-read format. It provides real-time monitoring and analysis, making it an essential tool for various settings such as business, finance, manufacturing, and healthcare. Dashboards are designed for specific purposes or use cases and can be used to track key performance indicators (KPIs), monitor performance metrics, and present data through charts, graphs, and tables.

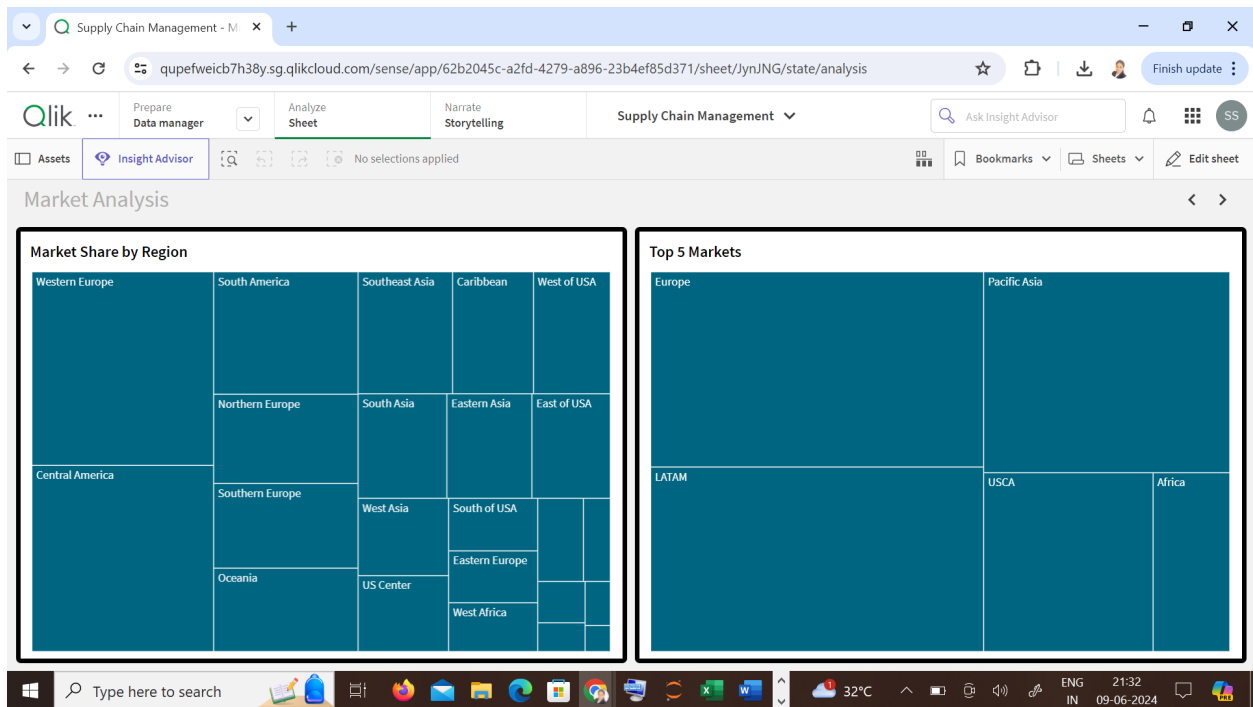
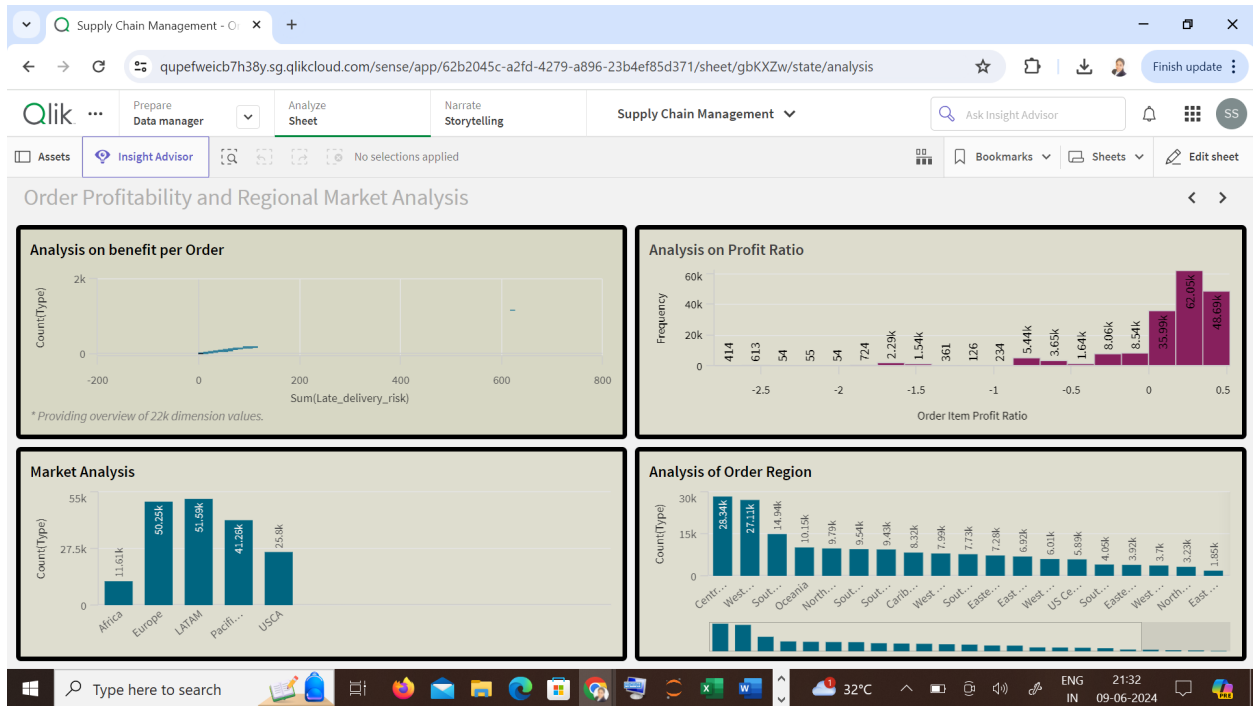
Responsive and Design of Dashboard

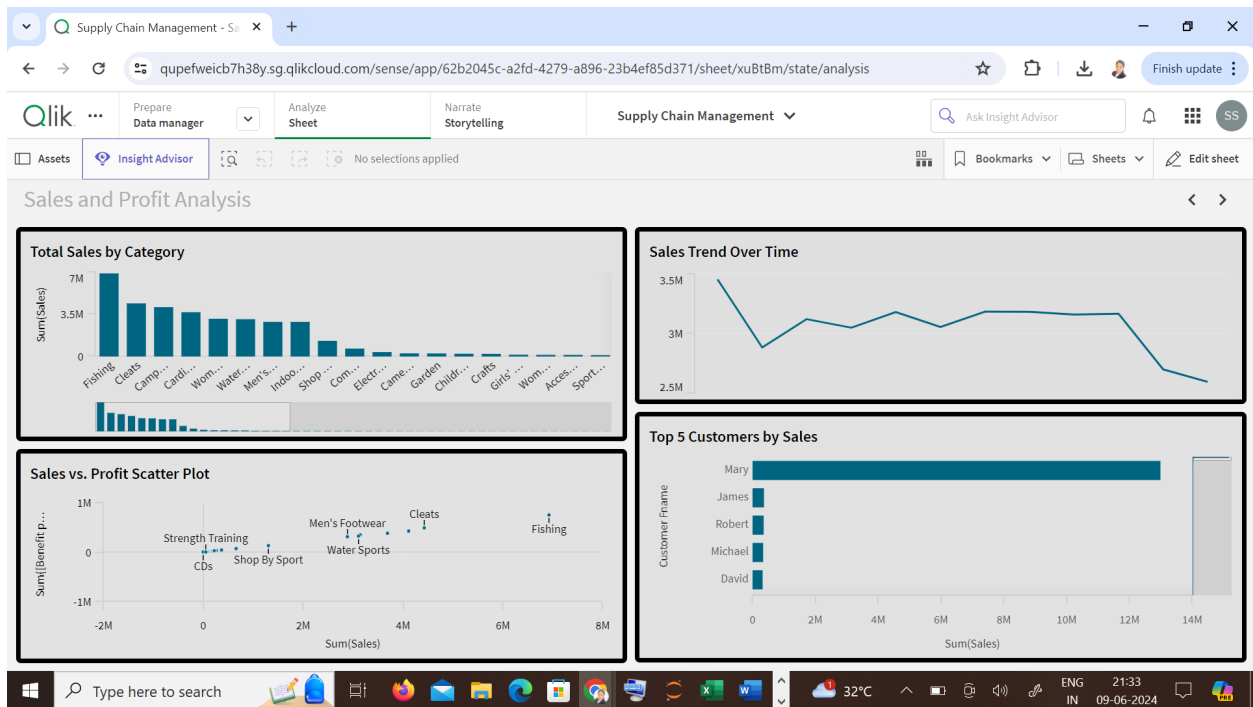
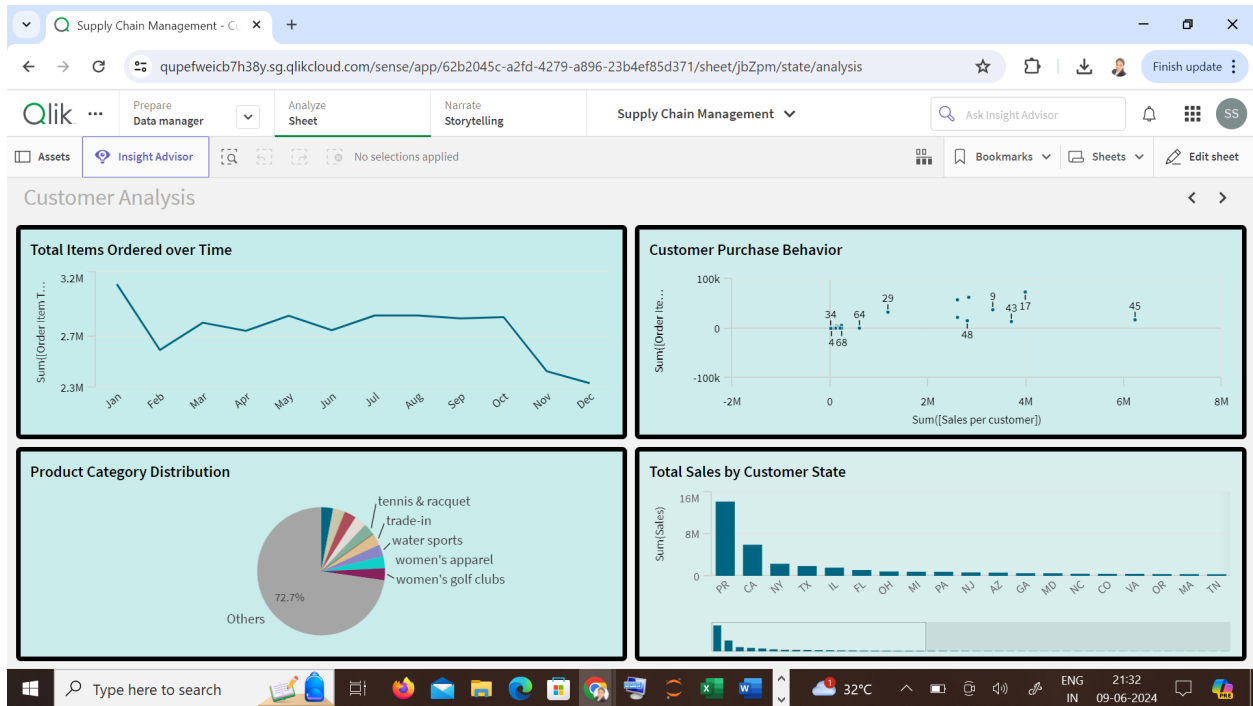
A well-designed dashboard is responsive and adapts to different devices and screen sizes, ensuring accessibility and usability across platforms. The design should focus on clarity, simplicity, and ease of navigation. Key elements to consider include:

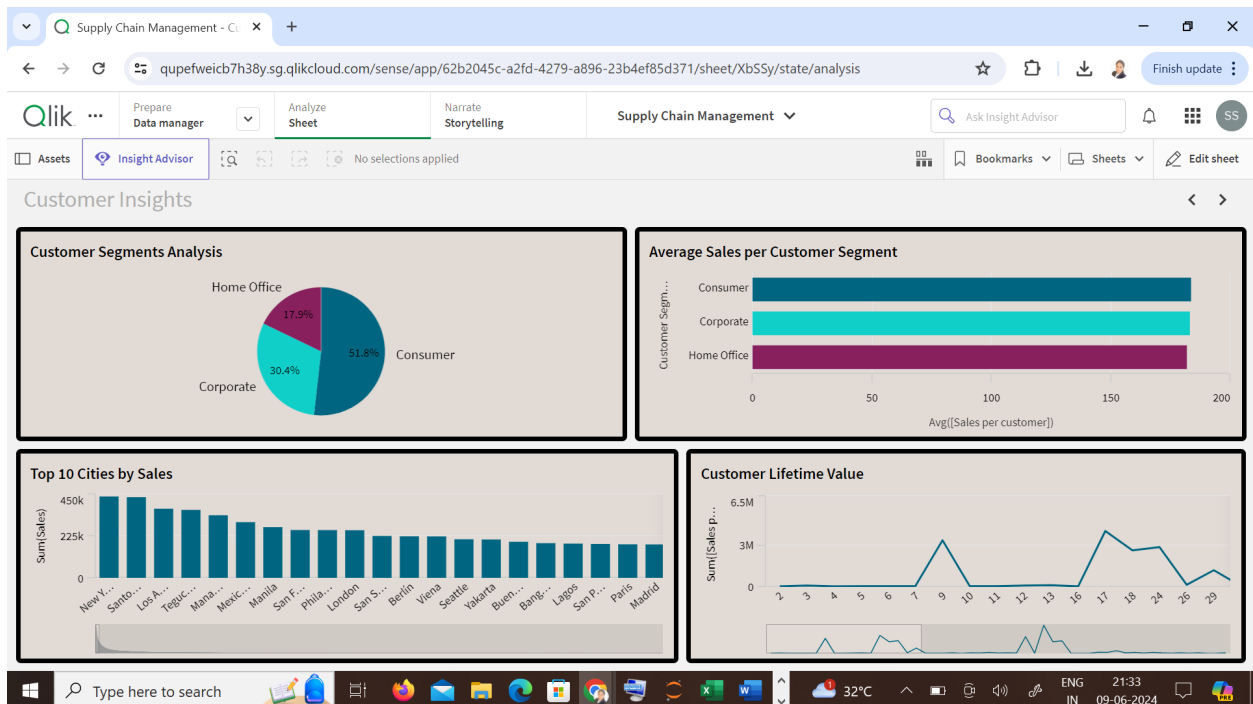
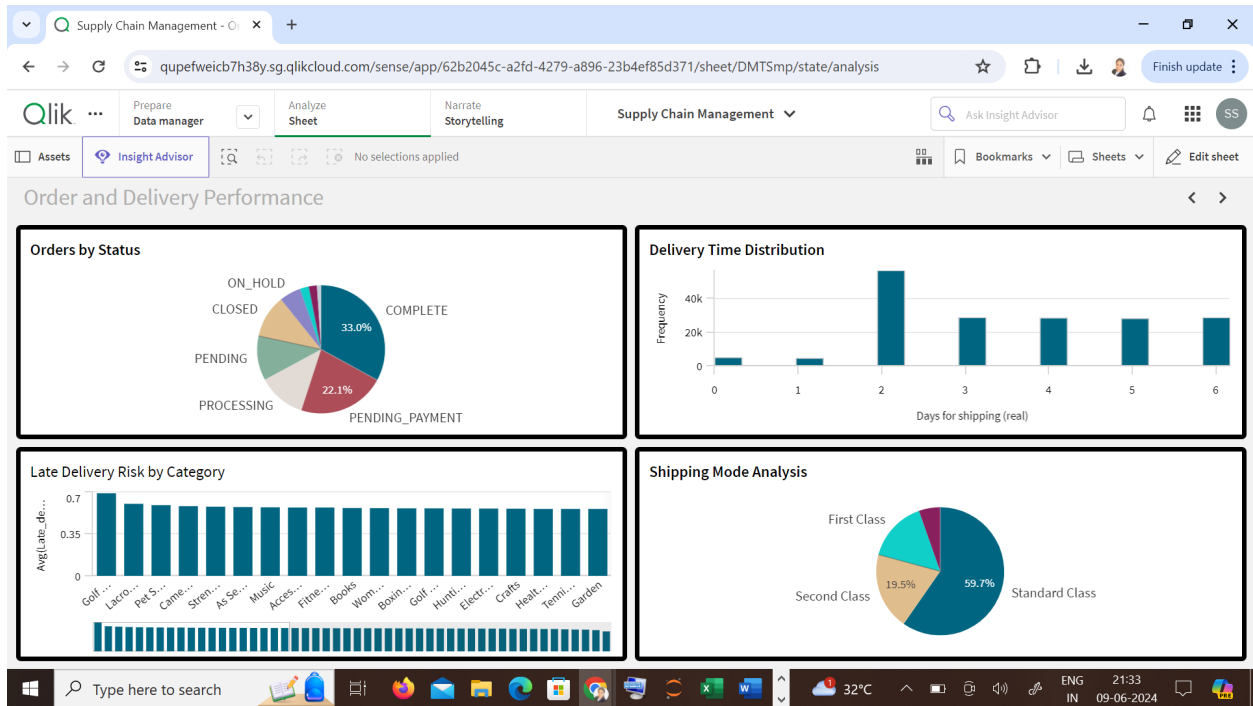
- **Layout:** Organize the dashboard in a logical manner, grouping related data and visualizations together.
- **Visual Hierarchy:** Highlight the most important information and ensure it is easily noticeable.
- **Interactivity:** Incorporate interactive elements such as filters, drill-downs, and tooltips to allow users to explore the data in more detail.
- **Consistency:** Maintain a consistent design language, including fonts, colors, and styles, to create a cohesive look and feel.
- **Scalability:** Design the dashboard to handle increasing amounts of data and users without compromising performance.

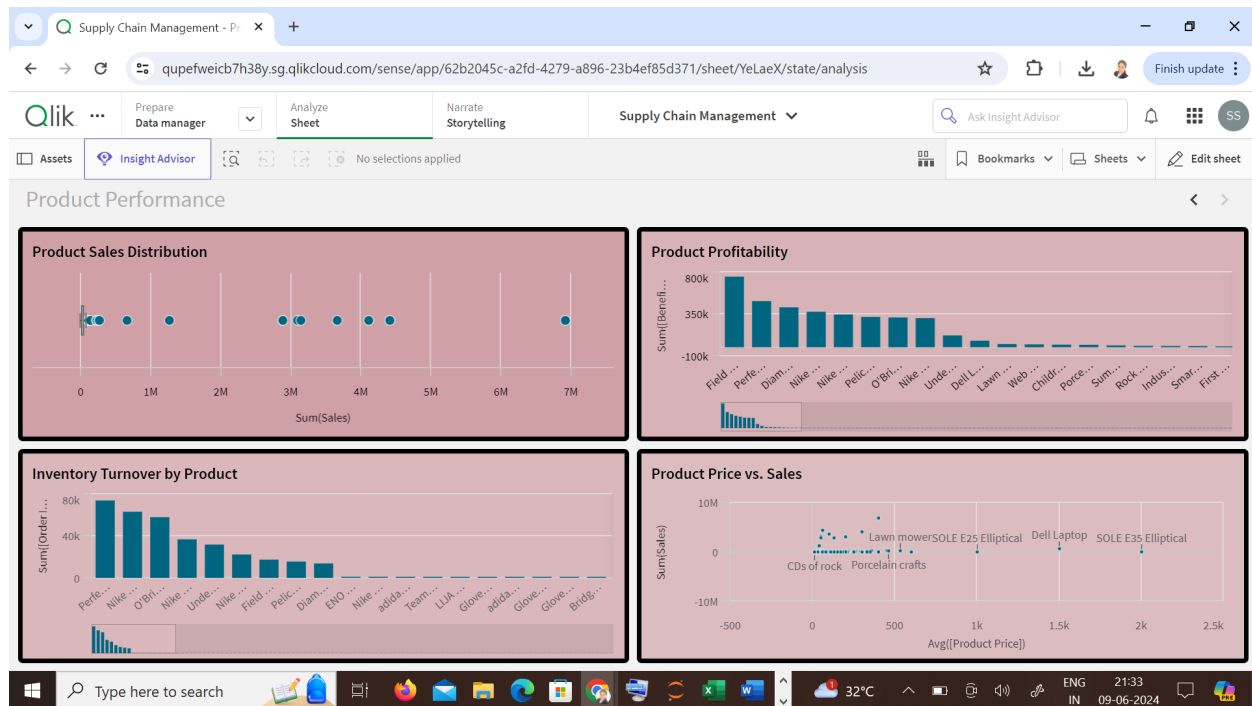
Screenshots of the dashboard are provided below to illustrate its design and functionality.











7. Report

7.1 Report Creation

Report Creation

Creating a report involves compiling and presenting data and analysis in a structured and accessible manner. Reports can be used to communicate insights, findings, and recommendations to stakeholders. In this project, reports will be created using Qlik Cloud to leverage its powerful data visualization and reporting capabilities. The report will include various visualizations such as line charts, pie charts, box plot, etc. to illustrate key metrics and insights derived from the data.

8. Performance Testing

8.1 Amount of Data Rendered

Amount of Data Loaded

"Amount of Data Loaded" refers to the total volume of data that has been successfully imported into the system or application. In the context of this project, it involves the data imported into

Qlik Sense for analysis and visualization. Ensuring that large volumes of data are efficiently rendered without performance degradation is crucial for maintaining the usability and responsiveness of the dashboard.

8.2 Utilization of Data Filters

Utilization of Filters

"Utilization of Filters" refers to the application of various filtering mechanisms within the system to selectively focus on specific subsets of data. In Qlik Sense, filters can be used to narrow down data views based on criteria such as date ranges, geographic locations, product categories, and customer segments. Effective use of data filters enhances the ability to drill down into the data, uncover patterns, and generate actionable insights.

Story

Data Story

A data story is a narrative that presents data and analysis in a coherent and engaging way, making complex information more understandable and impactful. A well-crafted data story includes:

- **Introduction:** Sets the stage by explaining the context and purpose of the data analysis.
- **Body:** Presents the data and analysis logically, using visualizations to highlight key points and trends.
- **Conclusion:** Summarizes the main findings and their implications, providing actionable insights.

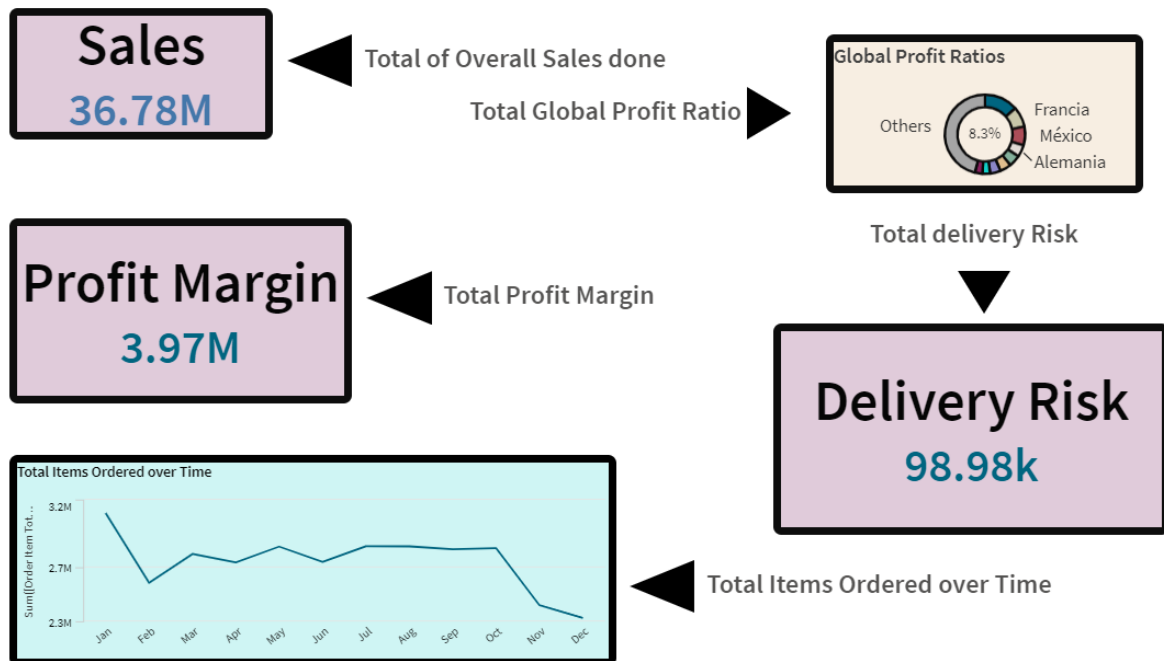
Data stories can be delivered through various formats, including reports, presentations, interactive dashboards, and videos.

Design of Story

Designing a compelling data story in Qlik Cloud involves:

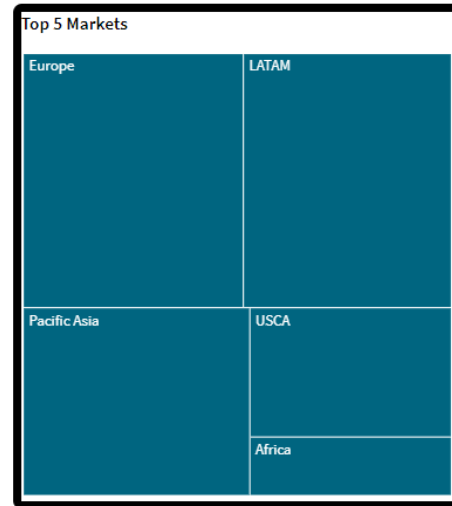
1. **Connecting to Data Sources:** Importing data from relevant sources such as databases, Excel files, or cloud services.
2. **Creating Visualizations:** Developing charts, graphs, and other visual elements to represent the data clearly and intuitively.
3. **Customizing Appearance:** Enhancing visual elements with consistent formatting, colors, and styles to improve readability and engagement.

4. **Organizing Content:** Arranging visualizations in a logical sequence on the canvas to ensure a smooth narrative flow.
5. **Formatting for Clarity:** Ensuring that all elements are clearly labeled and that the report layout is clean and uncluttered.
6. **Creating Dashboards:** Summarizing key insights on a dashboard for a high-level overview.
7. **Iterating Based on Feedback:** Continuously improving the report design based on user feedback to ensure it meets the audience's needs effectively.



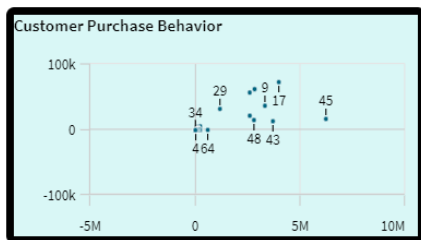


This Tree Chart illustrates the sales contribution of each region to the overall market

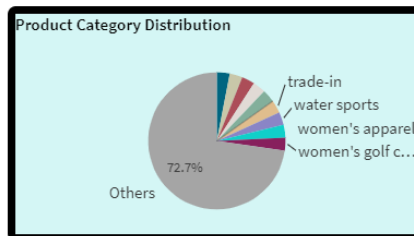


This Tree Chart illustrates the sales contribution of Top 5 regions to the overall market

Below Line Chart shows the total of items ordered by the customers over total time duration

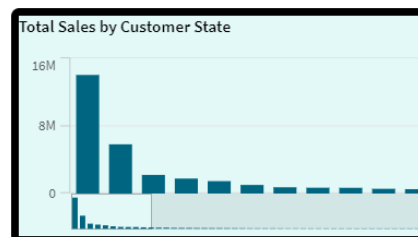


The Above Chart shows the customer purchase behavior

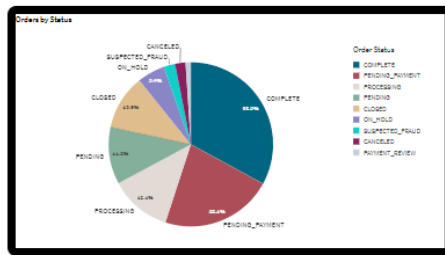


The Pie Chart shows the distribution of product categories

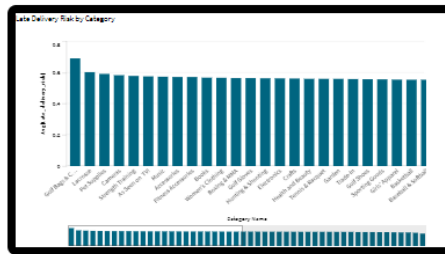
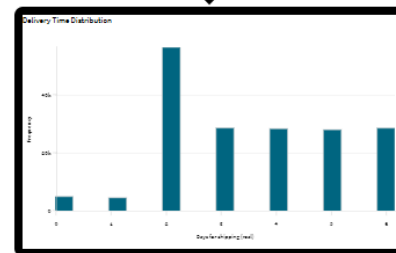
Below Bar Chart shows the total of sales by the customers by state



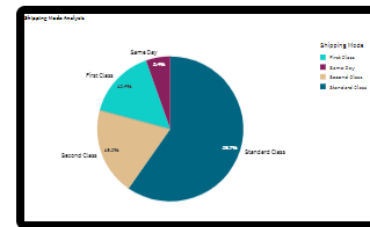
The pie chart presents the distribution of order statuses (e.g., complete, pending). It helps in assessing the efficiency of order processing and identifying areas where delays or issues may occur.



This histogram shows the distribution of actual delivery times, highlighting how often deliveries meet, exceed, or fall short of scheduled times. It aids in evaluating the reliability and efficiency of the delivery process.



The bar chart displays the average late delivery risk for each category. It helps in identifying categories prone to delivery delays, allowing for proactive measures to improve delivery performance.



The pie chart shows the proportion of different shipping modes used (e.g., standard, express). It provides insights into customer preferences and the performance of each shipping option.

Performance Testing

Amount of Data Rendered

Testing the performance involves ensuring that the system can handle the amount of data loaded without compromising on speed or usability. This includes verifying that data is rendered quickly and that visualizations update efficiently as filters and parameters are applied.

Utilization of Data Filters

Effective utilization of data filters is tested to ensure that users can seamlessly apply and adjust filters to focus on specific data subsets. This enhances the interactive experience and enables users to gain deeper insights from the data.

Number of Visualizations/Graphs

The following visualizations will be included in the report to provide comprehensive insights:

- **Global Profit Ratios**
- **Total Items Placed by Customer in Country**

- **Total Items Placed by State**
- **Analysis on Customer Segment**
- **Mode of Payment**
- **Customer Purchase by City**
- **Delivery Status of Orders**
- **Analysis on Benefit per Order**
- **Analysis on Profit Ratio**
- **Market Analysis**
- **Analysis on Order Region**

These visualizations will help to analyze various aspects of the data, providing a detailed understanding of performance metrics, customer behavior, and operational efficiency.